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A PORTABLE WIND-DIRECTION RECORDER

By Robert A. Fulton, Division of Truck Crop and Garden Insect Investigations

A portable wind-direction recorder was found very useful in the study of dispersal of the beet leafhopper (Eutettix tenellus (Bak.)). The sensitiveness of the instrument should make it capable of recording at least eight points of the compass. Most commercial instruments for this purpose were too expensive and cumbersome, owing to the complicated recording devices, which required constant attention, and, in some cases, the necessity of using batteries. Furthermore, there was great likelihood of breakage in transport over rough desert country. One portable instrument has been described.[1] However, since that instrument, on account of the length of the box containing the recording device and the total length of the assembled instrument, was not considered suitable for use in the beet leafhopper investigations, it was decided to develop a recording unit which could be mounted on poles in the desert and would record wind directions accurately in high winds. The instrument described herein has been amply tested by continuous service over a 9-year period in different sections of the country.

The action of the mechanism depends upon an offset wind-vane shaft revolving directly above a circular chart, with the center of rotation midway between the center and the margin of the recording chart. A commercial 8-inch circular chart was used. The radius of the circle described by the recording pencil was 2 inches. A circle of this size was found satisfactory for accurate records, as it is sufficiently large to reduce to a great degree the blurring caused by sudden changes in the direction of the wind. Prevailing winds usually describe an arc of at least 20 degrees, and, even with an efficient stabilizer on the vane, surface obstructions of the terrain cause changes which make it impossible to obtain straight-line recording. The small arc described by the vane-operated recording pencil is used to determine both time and direction.

Two views of the apparatus are shown in figures 1 and 2, and a sectional drawing in figure 3. A record from one of the established instruments is shown in figure 4.

1/ Covert, R. N. Meteorological Instruments. Journal of the Optical Society of America 10(3): 330-332. 1925.

In the construction of the instrument the wind-vane shaft housing (fig. 3, D) was first made by the use of standard pipe fittings, including a 1-inch floor flange, a 1-inch nipple 8 inches long, and a reducing coupling 1 inch to 1/2 inch. Both ends of the nipple were milled so that a 7/16-inch roller bearing (C) could be fitted in the ends of the pipe. The wind-vane shaft (B) was made from 1/2-inch shafting. The ends of the shaft were turned down so that the shafting would form a tight fit in the roller bearings. The upper end of the shaft was then milled to 3/8 inch and threaded to provide a support for the wind vane (A). The bottom of the shaft (F) was then grooved the width of the pencil arm and threaded to hold a 1/8-inch machine screw. The pencil arm (G) was made from an inexpensive compass by cutting the pointed arm about $1\frac{1}{2}$ inches from the hinge. The hinge was made flexible by removing the tension spring. The recording pencil could then move horizontally but was held rigid in a vertical position. It is very important to install this hinge, for without it irregularities in the chart surface will not be marked by the pencil. The box containing the clock and the chart holder were next assembled.

The clock (I) was a regular 7-day movement used in circular-chart recording instruments. The clock and chart support positions within the box were found by locating the center of the wind-vane shaft exactly midway on the radius of the circular chart. The center of the circular chart was then aligned with the edge of the box so that when the instrument was placed in the field the shaft and the center of the chart would be aligned in a known direction.

The wind vane shown in figure 1 was designed to record slight deviations on very calm days. The wedge type (commonly used on weather instruments) would probably be more suitable for general observations, but in all cases the vane should be balanced to prevent excessive wear on the bearings.

The recording is translated by means of a flexible glass guide (fig. 5, B) that has been marked to correspond to the 4-inch circle that may be described by the pencil of the wind vane. The circle is then divided into quadrants, N, E, S, and W representing the four cardinal directions. The flexible glass guide is held in a fixed position and the chart is rotated under the guide. The coincidence of the arc made by the pencil and the circle on the guide indicates the direction and time of the recording.

For example, if the arc described by the recording pencil is found to be on the periphery between N and E, a northeast wind would be indicated. The time of the recording would be obtained at A in figure 5. The above illustration would be a northeast wind at 12 midnight Saturday.

In some localities it may be necessary to align the instrument in an east-and-west direction. If the instrument described above were used in a region of prevailing southerly winds, the recording would be confined to a small portion of the chart.

The instrument was assembled for approximately $20, including the cost of parts and labor, but the clocks may now be more expensive.

Explanation of Illustrations

Figure 1.--General view of portable wind-direction recorder.

Figure 2.--Close-up view showing lower end of wind-vane shaft, pencil arm, chart, chart support, and clock.

Figure 3.--Sectional drawings of portable wind-direction recorder.

A - Wind vane.
B - Wind-vane shaft.
C - Roller bearings.
D - Wind-vane shaft housing.
E - Wind-vane shaft support.
F - Lower end of wind-vane shaft.
G - Pencil arm.
H - Chart support.
I - Clock.

Figure 4.--Chart showing record made by wind-direction recorder.

Figure 5.--Sample chart and flexible glass guide, illustrating method of obtaining wind direction and time of recording from chart.

A - Time of recording.
A'- Position of center of arc described by recording pencil.
B - Flexible glass guide.

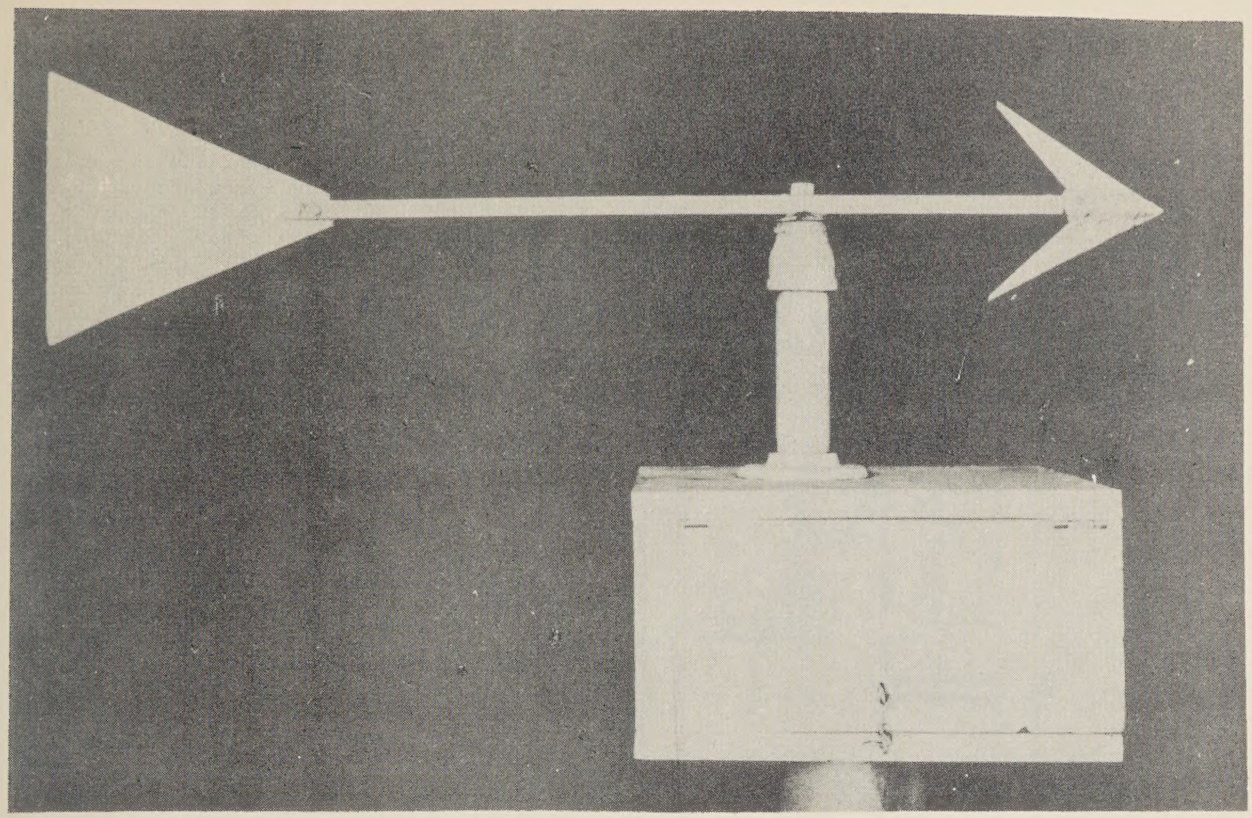

Figure 1

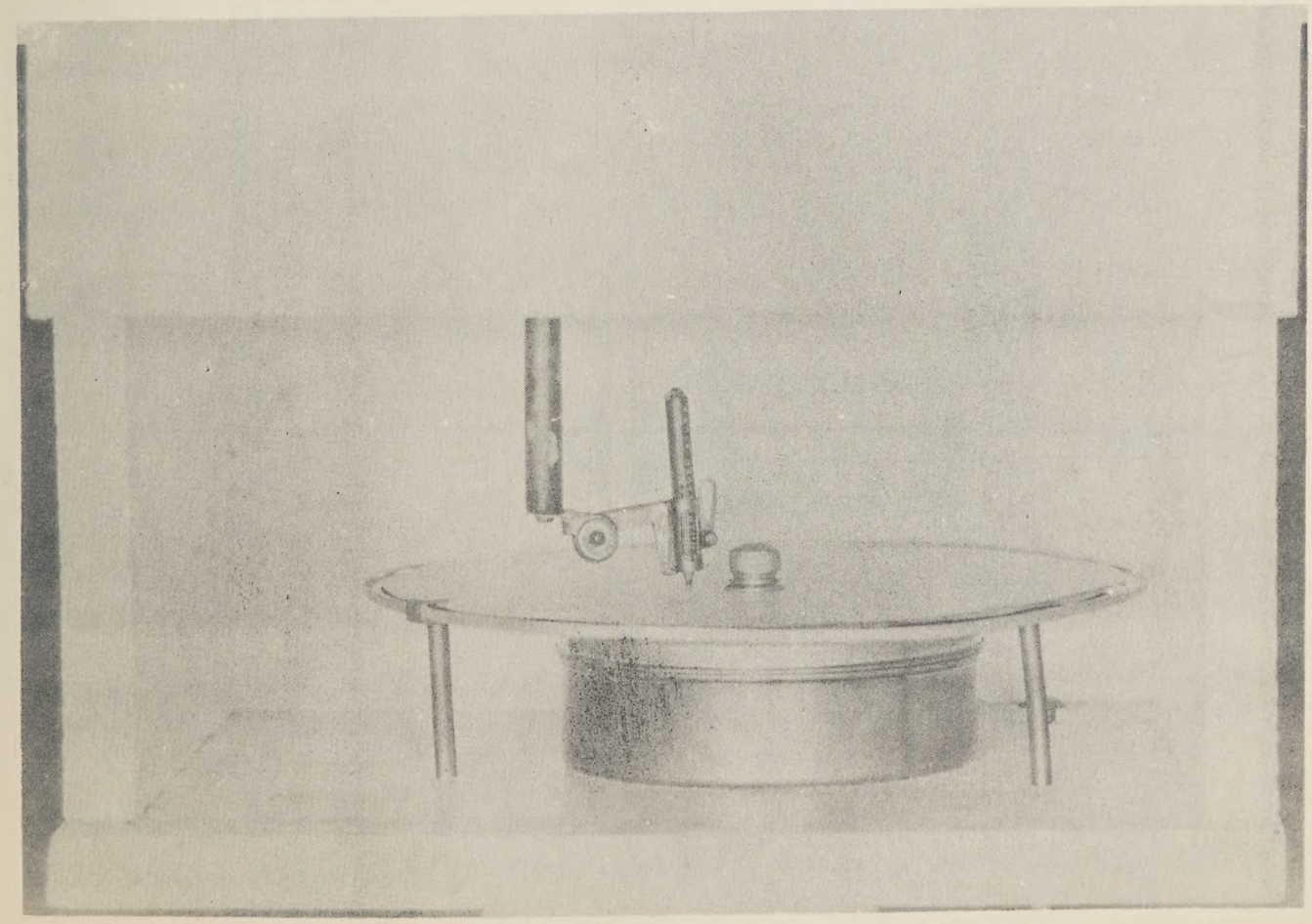

Figure 2

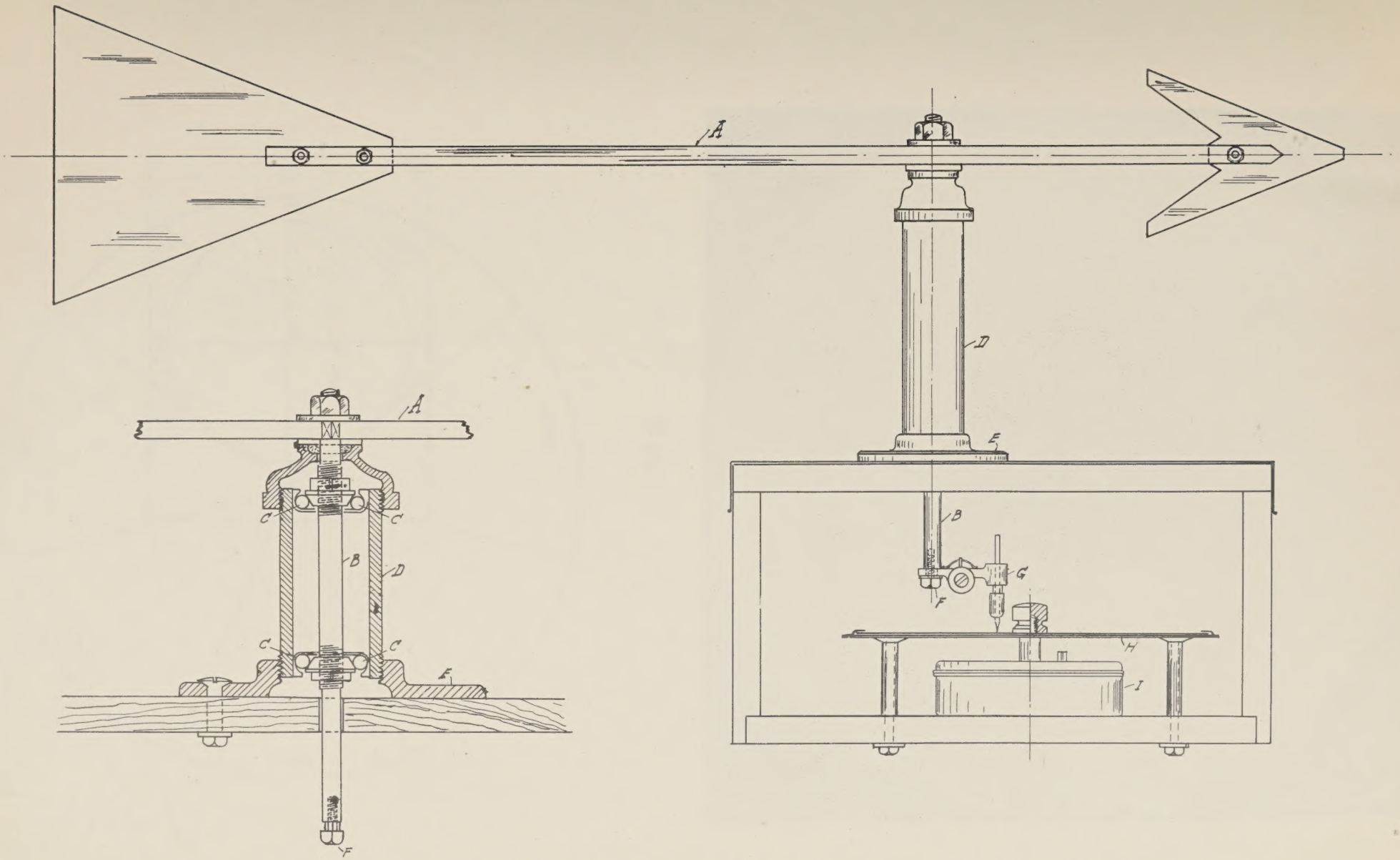

Figure 3

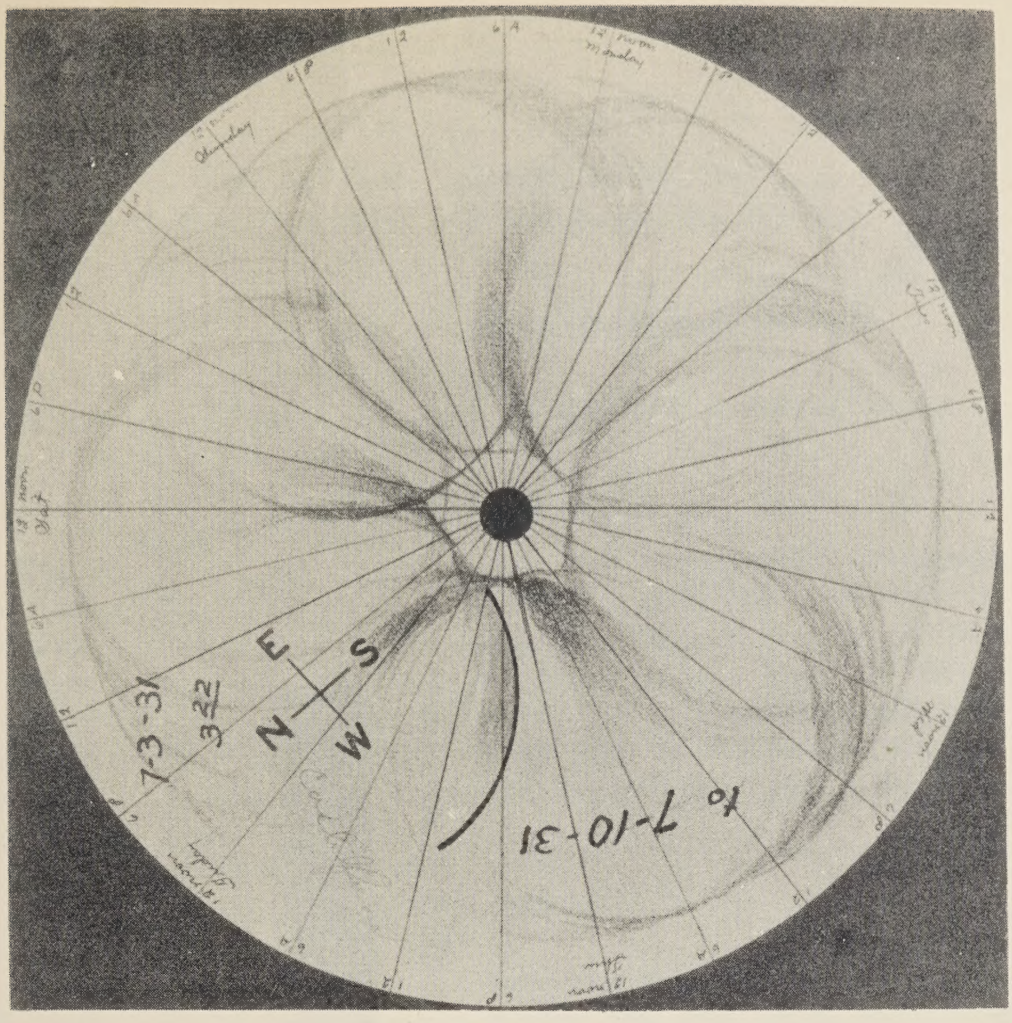

Figure 4

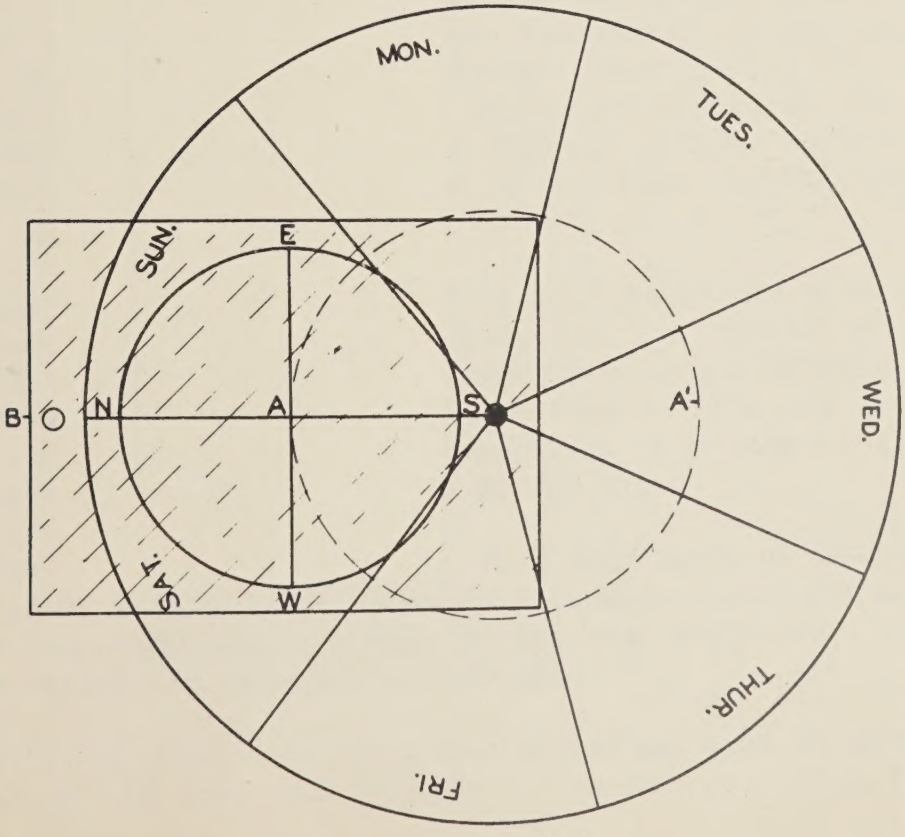

Figure 5